

# SERBEP Update

DECEMBER 1995

## A Publication for the General Biomass Community

The Southeastern Regional Biomass Energy Program is one of five regional biomass energy programs. It is administered for the U.S. Department of Energy Office of National Programs by the Tennessee Valley Authority's Environmental Research Center in Muscle Shoals, Alabama. The 13-state region includes Florida, Kentucky, Mississippi, Georgia, North Carolina, South Carolina, Virginia, West Virginia, Missouri, Tennessee, Louisiana, Arkansas, and Alabama.

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## ELECTRICITY FROM AGRI-FORESTRY

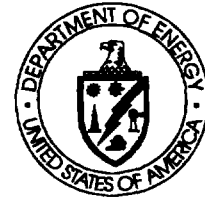
A revolution is quietly taking place in central and western New York State that, when combined with similar activities elsewhere, will soon spread and transform America. The revolution has special implications for agriculture, rural economic development, and energy production in America. However, the project will benefit society as a whole in a number of ways including improving air quality by reducing utility emissions, reducing the use of tax dollars for farm subsidies, and pushing the country toward a sustainable energy future.

The project in New York currently involves the growing of willow trees as agricultural crops to be cofired with coal in existing utility boilers to generate electricity. Eventually, generating stations would be built that would use newer, more efficient generating technologies and burn only wood fuels. Projected rural economic development benefits from the project include the creation of 287 jobs and over \$9.1 million annually in income by 2006.

The project comes at a time when many rural areas in America are struggling for survival and rural New York State is no exception. Agriculture in the state is annually a \$2.6 billion industry and one of the state's most important sectors. However, between 1987 and 1992 the number of farms declined by 14% and the number of acres farmed by 11%. Of all farms reporting, only 52% earned a profit in 1992. However, 33% of the reporting farms accounted for fully 92% of all agricultural sales. Thus, most small farms are in need of economic revitalization, such as from the production of fast growing trees.

Since the 1930's, land removed from agriculture in New York State has generally been abandoned and returned to forest. However, for a variety of reasons, the developers believe it is not cost effective or environmentally desirable to convert current forest lands into production areas for fast growing trees.

Leader of the project is the Empire State Biopower Consortium which includes Niagara Mohawk Power Corporation (NMPC), New York State Electric and Gas Corporation (NYSEG), and the State University of New York College of Environmental Science and Forestry. Financial support and technical assistance is being provided by the Electric Power Research Institute, DOE's National Renew-



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**IFREE**—The International Fund for Renewable Energy and Energy Efficiency (IFREE) was established to foster financially and environmentally sustainable energy projects in emerging markets and to facilitate partnerships between energy entrepreneurs in the US and their counterparts in developing countries. IFREE's goal is to promote the utilization of environmentally sound energy technologies to meet the energy and development needs of less developed countries. The subject technologies include, but are not limited to, commercial applications of biomass, conservation, geothermal, hydropower, natural gas, solar photovoltaic, solar thermal, and wind energy. IFREE accepts proposals for conditional loans of up to \$50,000 for a maximum of one-half of the cost of project pre-investment studies for sustainable renewable energy, energy efficiency, and natural gas projects in the developing world. Financing for IFREE's programs is provided by USEPA, USDOE, USAID, and the Rockefeller Foundation. For further information, contact the IFREE Washington Office, (202) 408-7916, fax (202) 371-5116.

able Energy Laboratory, and the New York State Energy Research and Development Authority.

The business enterprise being developed by the Empire State Biopower Consortium combines the strengths of entrepreneurial farmers and forward-looking utility companies in New York and the Northeastern United States. As partners in the enterprise, they will forge a long-term business relationship that will provide the necessary capital and expertise to develop an energy crops market and infrastructure in the Northeastern US. The business will be built around three groups with different responsibilities but having common interests in desiring profitability.

The first of the three business partners is the growers. Growers within a 30-50 mile radius of power plants will plant trees in 75-300 acre plots using willows initially. Since the trees are clones, they are not grown from seed but from cuttings (10-12-inch long pieces of young tree stems). Trees are planted in the spring by inserting cuttings partially into the ground where they sprout. Tree crops will diversify farm income, and yield an estimated 6% internal rate of return on the growers' investment. Most importantly, it will allow the land to stay in productive crop use.

The second of the three business partners is the energy crop cooperative. Growers will earn income through operation of the Empire State Grower's and Associated Utility Cooperative (ESGAUC). In addition to earning income through fuel sales to the utility, service fees will be earned on the rental of the specialized planting and harvesting equipment owned by the cooperative. The cooperative will also be responsible for procuring any biomass residues (e.g., sawdust) in the area that could be used for fuel.

The third of the three business partners is the utility members of the consortium. These utilities would invest in the energy crop cooperative and receive fuel at a reduced price. Since the use of biomass fuels decreases some utility plant emissions (e.g., NOx, SOx), the utilities can reduce their

costs for controlling emissions. Government regulations allow utilities to use the amount of emission reductions from one generating station (emission credits) to offset emissions from other generating stations. These emission credits can also be sold to other utilities. The ability to obtain and use emission credits is a big advantage for biomass fuels and the utilities that use biomass fuels.

The project will proceed in scheduled phases. To ensure profitability, the ESGAUC will initially establish regional cooperatives that serve a minimum of 3,000 acres. Although the member utilities have four power generating stations in the area that use pulverized coal fuels, the first cooperative will serve only the Greenidge Generating Station. Eventually, the Greenidge cooperative will reach 5,000 acres capable of supporting 15% cofiring with a 50-50 blend.

Willows will be planted at a density of 6,200 trees per acre on a 3-year harvesting cycle. Willows, like most hardwoods, will resprout from the stumps (coppice) after harvesting and will not need to be replanted after every harvest. After six or seven harvests, the plants usually lose their vigor and must be replanted.

The total capital investment in cooperative equipment for a 3,000 to 5,000 acre operation is projected to be approximately \$500,000. Prices for willow fuels delivered to the generating station are projected at \$46 per ton initially and falling to \$33 per ton (\$1.96 per million Btu's) as acreage and equipment utilization increases, and as yields improve from the current 7 dry tons per acre per year. For comparison, utility coal prices in the Northeast are currently in the range of \$1.50 - 1.80 per million Btu's.

Within 10 years, production of tree crops is expected to reach 116,000 dry tons per year grown on 15,000 acres. These tree crops will be combined with 338,000 tons of residue fuels to provide fuel to four cofired generating stations in NYSEG and NMPC territory.

The project developers have been working on this concept since 1988 and are optimistic about their future. Their work is also



the financial subsidiaries of large corporations such as General Electric or Chrysler with various investment criteria driven by the financial health, business goals, and tax considerations of their parent companies. They function much like commercial banks, but may offer longer term debt at somewhat higher interest rates than banks and insurance companies. They are usually open to considering biomass projects and are more flexible in their evaluation of project risk. In some cases they can provide part of the required project equity. Some commercial lenders may require a profit participation from the project, which has the effect of increasing the interest rate considerably. In general, commercial lenders represent a more expensive source of financing than banks and insurance companies.

*Equipment Leasing Companies*—There are several national equipment leasing companies that have project finance departments which will consider biomass projects. They function in much the same way as commercial lenders. It may also be possible to use simple equipment leases to finance some biomass projects, on a nonrecourse basis, if the fuel supply is very predictable and the revenue to the project is coming from a customer with a high credit rating. Most important is the nature of the promise to pay by the purchaser of the power or commodity that brings revenue to the project. If the agreement to purchase the power or commodity is guaranteed (i.e., the payment is made regardless of delivery of the power or commodity), then an equipment lease may be appropriate. The advantage of this approach would be avoidance of engineering reports, high legal fees and extensive due diligence usually associated with project finance. If the lease is a true lease, involving residual risk, the lessor will require additional assurances concerning the life and remarketing of the equipment and will insist on proven technology.

*Equity Investment Funds*—There are several energy investment funds which invest equity in biomass projects. They can

provide the necessary equity to qualify for debt financing. Since most of these funds expect pretax returns of between 18 and 25% or more, the project must be very profitable to qualify without the leverage provided by debt. The expected return on equity will depend on the perceived risk level (equity invested early in the development phase is at greater risk) and on whether the developer also contributes risk equity. While this method of finance can be very expensive and can result in loss of ownership in the project, the cost may be mitigated by reduced financing costs such as legal and engineering fees. In addition, equity funds may be able to utilize tax incentives associated with biomass projects, such as income tax credits and short tax depreciation schedules. If the equity fund includes the value of tax benefits in its return on investment analysis, the amount of cash return required by the fund may be significantly reduced, thereby leaving more cash in the project for the developers, operators, or other parties. The time required to close on equity financing can also be considerably less than the time necessary to close on combined equity and debt financing.

*Municipal Bond Financing*—With private ownership by the developer, a project may qualify for tax-exempt governmental bond status, provided that the project meets certain criteria. To qualify, the project must generally provide some form of public benefit such as furnishing local electricity, heating or cooling, or disposing of solid waste.

Availability of tax-exempt bond financing varies from state to state, and the market for bond issues of less than \$5.0 million is very limited. Care must be exercised in identifying an underwriter with experience in this marketplace. While tax-exempt bonds may allow financing with very low interest rates, especially with investment grade projects, the costs associated with municipal bond financing can be so high as to bring the total financing costs very near the cost of other forms of debt. Additionally, the benefits of lower interest rates

#### **Proceedings**

**Available**—Proceedings from the Second Biomass Conference of the Americas, held August 21-24, 1995, in Portland, Oregon, may be obtained from Milly Lemmons, National Renewable Energy Laboratory, 1617 Cole Blvd., Golden, CO 80401, phone (303) 275-3098, fax (303) 275-3097. Proceedings are \$50 each. Payment may be made in any form except credit card and must be in U.S. funds. Payment must be received in advance.

that come with tax-exempt financing may offset the benefits of tax credits. Thus, a project may not be able to benefit from both tax credits and tax-exempt financing.

#### **General Lender Requirements**

The following is a list of typical lender requirements:

**Fuel Supply**—Borrowers may need executed long-term supply contracts, samples of fuel or test wells for landfill gas projects, or models of gas production for landfill gas projects.

**Power Sales Agreement**—For power projects, borrowers should have a signed power sales agreement with the utility or industrial plant with a term that matches the debt repayment schedule. It is helpful if the agreement has a capacity payment that covers expenses, with *force majeure* provisions and escalation clauses. Additionally, an interconnection agreement should be executed.

**Permits**—It is advisable to have all required permits prior to financing wherever feasible. Only those permits which are certain to be given should be obtained after financing.

**Equipment**—The project should employ proven technology, with performance guarantees and warranties from the vendor. Where possible the project should use major vendors.

**Operations and Maintenance**—The project should use a qualified operator with a proven track record. Additionally, it may be desirable to have this service provided by an equity investor.

**Construction**—Borrowers should obtain fixed price turnkey contracts which contain completion bonding, equipment acceptance standards, and penalties for late performance.

**Financial Model**—Lenders will usually expect to see a financial pro forma which includes debt coverage ratios (usually in the range of 1.3 to 1.6 is required by lenders), debt reserve accounts, working capital requirements, interest during construction schedule, income tax calculations, tax credit calculations, budget for major equipment overhauls, complete de-

tailed construction budget and complete project sources and uses analysis. If the developer is not experienced in building the pro forma, it is advisable to secure a financial advisor to perform this service.

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#### **STRATEGIES FOR EXPANDING BIOMASS POWER IN A TOUGH UTILITY ARENA**

The following article examines the challenges biomass power faces in the utility arena and highlights approaches for addressing a number of benefits this technology offers that are generally overlooked in the current marketplace.

Following a dramatic expansion in installed biomass power capacity in the U.S. in the 1980s, biomass power has seen a sharp slow-down in growth in the 1990s. Recent legislative as well as administrative actions at the federal and state levels have played an important role in fostering significant changes in the utility sector, contributing to a highly competitive environment and intense pressures to lower electricity rates. For example, the Energy Policy Act of 1992 created exempt wholesale generators; recent Federal Energy Regulatory Commission (FERC) rulings are liberalizing transmission access (including the March 29, 1995 Notice of Proposed Rulemaking which introduced sweeping changes that will allow wholesale wheeling in the electric industry); and numerous state actions are fostering retail wheeling and utility deregulation.

State legislatures and regulators have also become increasingly concerned about the economic competitiveness of their states. They are keenly aware of the extent to which high electricity rates can adversely impact their ability to attract or retain industry and associated jobs and income.

With current low prices for natural gas fuels and power plants, the electric utility

#### **HPA Membership**

**Directory**—The *Hearth Products Association 1995-1996 Membership Directory* is now available. The directory lists HPA members by company name, contact person, geographical location, and also by manufacturers' brand name. Copies are available for \$15 from Hearth Products Association, 1601 North Kent Street, Suite 1001, Arlington, VA 22209, (703) 522-0086, fax (703) 522-0548.

## Reports

**Available**—Two reports have recently been issued by the Great Lakes Regional Biomass Energy Program. *Wood Ash in the Great Lakes Region: Production, Characteristics and Regulations* was prepared by Gary McGinnis of the Institute of Wood Research at Michigan Technological University. This report summarizes the regulatory status of wood ash disposal in the Great Lakes Region and the analytical tests required to permit land application of wood ash. *Transient Emissions Testing of a DDC 8V-92TA Ethanol Engine* is the final report of Detroit Diesel's effort to develop and demonstrate a heavy-duty eight cylinder engine that operates on ethanol as the primary fuel. The investigation was thus to demonstrate the viability of ethanol fueled engines for heavy truck use. For copies of these reports, contact Fred Kuzel, Council of Great Lakes Governors, 35 East Wacker Drive, Suite 1850, Chicago, IL 60601, (312) 407-0177, fax (312) 407-0038.

industry has begun moving toward a significant dependence on natural gas as their fuel of choice for the future. While on the surface this appears to be the least-cost, least-risk approach, a more comprehensive view of total fuel-cycle issues reveals many risks to this approach. These risks include uncertainties in future gas price stability and availability, increasing dependence on imported supplies, upstream emissions and impacts from well drilling, and safety and cost risks associated with aging pipeline distribution networks.

Biomass power offers significant benefits such as reduced SO<sub>2</sub> and CO<sub>2</sub> emissions and local job creation, but the intensely competitive utility arena has tended to make the decision framework used in selecting energy sources more rigidly geared than ever toward least cost/lowest price criteria, resulting in the sense that there is less room to adjust for or accommodate social and environmental "externality" benefits or factors. In the present utility climate, the tendency is to view environmental and social impacts or externalities as "soft" factors that do not merit significant attention when seeking least-cost options for supplying electricity. State regulators and legislators need to be at least somewhat wary of the risks that this new framework implies, recognizing a need to take at least some modest actions to address longer-term societal concerns as a hedge or form of insurance that will provide flexibility for the electric supply system. A combined total fuel-cycle/externalities approach may ultimately offer prudent anticipation of significant future cost increases (such as potential price impacts from tightened regulations on upstream impacts from fossil fuels), thus helping protect ratepayers from future fuel price increases and helping mitigate related fuel availability impacts on utilities.

**Long-Term vs. Short Term Perspectives.** To adequately protect rate-payer interests, utility commissions and the state legislatures that oversee these commissions clearly need to have a long-term, as well as a short-term, perspective. The current push toward a narrowly based least-price frame-

work for electricity supply means that decisions regarding major investments in power production infrastructure are increasingly being driven by spot market fuel prices. While investments made on very short term criteria might be the least cost today, they may well prove to be very high cost investments in the longer term. For example, natural gas has shown significant price volatility over the last two decades and the price of petroleum has been found to be a major driver influencing the price of all competing energy sources. As our nation continues to be increasingly dependent on imported oil, the potential for rising petroleum prices and corresponding upward pressure on other energy prices is an increasing risk factor that could impact electricity rates.

Even with excess generating capacity in many areas of the U.S. and the current low fossil fuel prices, it may well be prudent to invest at least a modest amount in alternative power options such as biomass power, in order to maintain an essential experience base with this technology. This experience is needed in the power production and equipment manufacturing sectors, and in the facility design and fuel supply sectors associated with biomass power facilities. For example, advanced biomass technologies are emerging that will offer important benefits in terms of reduced system costs, increased conversion efficiencies, and reduced emissions.

Over the next few years, current trends in the electricity supply sector (driven by short-term price factors and deregulation) could severely undermine the modest base of biomass capacity and experience that has been established, unless some legislative or regulatory actions are taken. For example, as FERC's rulemaking to allow wholesale interstate wheeling of electricity is implemented, all those utilities with excess generating capacity are likely to seek opportunities to wheel their excess capacity to other customers. This excess power is likely to be sold at particularly low prices (under "economic development" rates or some similar terminology) that reflect only operating costs plus profits, with little or no

capital investment costs included. In the few years this process takes until the electric power industry returns to a more normal economic balance, the biomass power industry could be severely undermined.

Smaller scale highly decentralized power systems that use locally based fuels, such as biomass, could provide a valuable level of security against disruptions of long distance transmission systems. With continued efforts to deregulate the electric utility industry, possibly including retail wheeling as well as wholesale wheeling, our electric supply system may evolve into something analogous to the Internet. Renewables could potentially contribute significantly to the reliability of such a system. Short-term circumstances could, however, eliminate promising but vulnerable renewables such as biomass from the playing field. States and public utility commissions (PUCs) need to adopt a framework where at least modest investments are made in alternative options such as biomass power to secure longer-term benefits for their rate-payers.

There are considerable benefits in terms of local job creation from the use of in-state biomass fuel resources and power plants. Utility commissions are generally required by state legislation to seek only the least-cost electric supply options. Thus, PUCs typically do not feel they have the latitude to let consideration of job losses in the state override electric supply decisions. State legislatures, as well as the staff of governors' offices, need to assess whether they may have established an overly narrow and rigid least-cost framework that PUCs must follow.

### **Strategies for Supporting Biomass Power in the New World of Utility Deregulation**

*Diversified Portfolio Strategies*—Establishing or maintaining a modest base of renewable-based power supplies can be viewed as a form of insurance that will allow for a more timely scale-up and use of these resources in the future, if alternative power supplies are needed.

*Green RFPs/Set-Asides*—Green requests for proposals (RFPs) solicit bids for renewable power supplies which are considered to offer valuable environmental and social benefits. This is an emerging technique that has run into opposition in some states, for example, a "renewable set-aside" in New York has encountered opposition. However, Green RFPs have been successful in other cases. For example, a Green RFP by the New England Electric System (NEES) appears to be moving ahead quite successfully.

*Green Dispatching*—Having a renewable energy power plant on line will not necessarily mean it is chosen to provide power under the typical dispatch criteria used by utilities to provide base load, intermediate, and peaking needs. The primary criteria generally used in determining the dispatch order is based on a hierarchy where plants with least-cost power are dispatched first. The least cost in this case is typically based on operating expenses only (fuel and other operating and maintenance costs) and does not include fixed capital costs. This means, for example, that nuclear power would tend to be dispatched first, as would solar and wind power, since they all have low fuel costs. However, biomass fuel is often slightly more expensive than coal and natural gas, at present, thus a biomass power plant built under a Green RFP could sit idle under a least-cost dispatch structure, with negative impacts on its financial viability. Many states, particularly those in the Northeast, are actually served by multistate power pools. This adds an additional complicating factor to the dispatch issue, since a single state PUC will not have complete control over dispatch in a power pool. A multijurisdictional "green" dispatching plan may need to be negotiated in order to reap the intended externality benefits of biomass power. If only a few states in the power pool participated, there is a risk that FERC would overturn the rules for interfering in interstate commerce. However, with FERC's proposed rulemaking to allow wheeling of wholesale power, implications for the con-

### **Report**

**Available**—*Household Energy Consumption and Expenditures 1993* (October 1995) presents information about household end-use consumption of energy and expenditures for that energy. These data were collected in the 1993 Residential Energy Consumption Survey (RECS), the ninth in a series of nationwide household energy consumption surveys conducted since 1978 by the Energy Information Administration of the U.S. Department of Energy. More than 7 thousand households were surveyed for information on their housing units, energy consumption and expenditures, stock of energy-consuming appliances, and energy-related behavior. The information represents all households nationwide—97 million. Telephone orders may be directed to Superintendent of Documents, Main Order Desk, (202) 512-1800, fax (202) 512-2250, or write to U.S. Government Printing Office, P.O. Box 371954, Pittsburgh, PA 15250-7954 (GPO Stock No. 061-003-00932-8).

**Interpretive****Summary—The**

Council for Agricultural Science and Technology (CAST) has published *Waste Management and Utilization in Food Production and Processing*. This report identifies and describes the wastes and the wastestreams generated in the food production and processing industry. A large amount of organic material holds the promise of being available for conversion to useful products. A new emphasis should be placed on converting these wastes into marketable products. There is much potential to enhance the world food supplies through waste utilization. As the discussion about agriculture changes from production to sustainable production, waste products increasingly will be seen as valuable. Increasing efforts are being made to convert waste into marketable products so as to meet increasingly strict environmental regulations. This 135-page report (No. 124) is available for \$22 plus \$3 postage and handling from CAST, 4420 W. Lincoln Way, Ames, IA 50014-3447, (515) 292-2125, fax (515) 292-4512, internet, cast@netins.net. Individual and student members of CAST may request a free copy; please include \$3 postage and handling.

cept of green dispatching in this changing regulatory environment need to be explored further.

**Green Pricing**—An innovative market-oriented concept that directly serves the notion of consumer sovereignty is "green product differentiation." Just as state PUCs allow utilities to offer different service bundles to different customers (such as interruptible rates or demand-side management) they could allow utilities to offer "green kilowatt-hours" to customers at a different price than regular kilowatt-hours. A measurable percentage of total demand (based on the experience of other sectors) could be expected to choose green technologies. In order to convince ratepayers that "green" payments will actually end up supporting "green" power facilities, it may be necessary to build a pool of funds from these payments to be used for loans and financing for "green" technology plants or operations.

**Green Certification**—There is some indication that customers may question whether biomass based power offers sufficient environmental benefits to motivate them to pay more for this option. "Green" certification could provide an important way to help guarantee, in the public's mind, that biomass power is worth a premium price. Either independent certification or self-certification can be used. Independent certification would rely on a third party to evaluate the sustainability of biomass resource management and conversion facility operations. Self-certification would rely on internal evaluation that is subject to oversight by an outside agency with natural resource responsibilities. Green certification would help verify the sustainable management and operation of facilities involved with the generation, conversion, and combustion of biomass energy. Ultimately, certification could help improve the enthusiasm of the public regarding the use of biomass for energy.

**Performance-Based Rates or Tariffs**—Public utility commissions have typically required utilities to establish cost-based rates based on actual costs from the previous year. Some commissions, however, are now

requiring performance-based rates where a number of criteria have to be met in determining electricity rates. It is possible that the criteria could include meeting specific externality criteria or specific targets for power production from biomass or other renewable technologies.

As noted earlier, FERC's Notice of Proposed Rulemaking (NOPR), which was announced on March 29, 1995, will allow open access in the wholesale electric power market. This rulemaking is likely to significantly impact the ability to incorporate externalities into electric power decisions. While there are still many details to be worked out, there may be innovative ways to incorporate externality factors in this new wholesale wheeling environment. Under the NOPR, standard transmission tariffs will be established which will be paid by any electricity supplier who wheels power across those transmissions lines. To avoid unfair competition, the utilities which own the transmission lines will also have to charge themselves the same tariff. FERC will establish the tariff rates initially. In the second stage, utilities and their customers can file to modify the tariffs and rates, within the limits of nondiscriminatory open access outlined in the rule. In this second-stage process, it may be possible to incorporate factors such as externality impacts, or funding pools for alternative energy projects that offer insurance benefits in terms of future supply diversity protection.

**Increase Investor Sensitivity to Long Term Risks**—With low current prices for fossil fuels, the simple project economics of current direct combustion biomass technologies are often more expensive when compared to alternative power sources such as natural gas-fired combined-cycle plants. Increasing the attractiveness of biomass to investors depends on their acceptance of more sophisticated evaluation criteria that explicitly incorporate risk. For example, incorporating the risk of future CO<sub>2</sub> limits, land-use constraints, and other health and environmental factors, as well as the risk of higher gas prices may favorably shift the expected value of biomass projects relative to



gas-fired projects. Thus, one opportunity for influencing decisions is to encourage the use of financial planning techniques that acknowledge environmental and regulatory uncertainty and help investors weigh risks.

**Increase R&D**—Another path to increased investor interest is improvements in technology. There is an annual opportunity for input on the allocation of research and development funds at the Electric Power Research Institute and by government (especially the U.S. Department of Energy). Continued pressure for the support of biomass research and development projects will eventually bear fruit by improving commercial project economics and performance.

**Incorporate Biomass Considerations Into State Energy Planning**—The purpose of state energy planning efforts is, in general terms, to align multiple objectives of energy security, environmental improvement, and economic development. State energy plans guide the activities of utility and environmental regulators and help coordinate the goals of other state agencies with responsibilities ranging from economic development to finance and taxation. The multifaceted total fuel-cycle benefits of biomass make it a good candidate for effective promotion through the vehicle of a state energy plan.

**Work with Public Utility Regulators**—State public utility regulators are required under EPAct to adopt integrated resource planning (IRP) rules, and many states already have done so. The IRP framework allows explicit consideration of nonprice factors such as environmental impacts, fuel diversity, or local job creation. Introducing total fuel-cycle concepts (or simpler proxies like a zero CO<sub>2</sub> emissions assumption for biomass technologies) would be an appropriate intervention. Most states with IRP rules revisit them every few years, providing opportunities for influence.

Although subject to debate, it appears that total fuel-cycle considerations can be accommodated by tradeoff/multiattribute analysis approaches. This suggests that biomass supporters may want to encour-

age the growing interest in tradeoff analysis within IRP. The tradeoff approach would be well suited to the changing utility sector because it allows flexibility and can be tailored to particular priorities of decision-makers. Another approach is to introduce "zero-based" IRPs, those that put existing capacity on the table along with new capacity options; this approach is likely to increase the attractiveness of biomass power. The existing plants in a utility's portfolio are typically more polluting per unit of output than new technologies. Encouraging this approach, and/or social cost dispatch, could help counteract the trend of renegotiating wood power contracts in the Northeast due to capacity surplus.

**Work with Environmental Regulators In the Resource Selection Process**—Environmental regulators play an important role in influencing the resource selection process. There are many opportunities to provide input to these regulators to help them become better informed regarding biomass power attributes.

States are preparing state implementation plans (SIPs) that are driven in large part by the strict ambient air quality requirements of the Clean Air Act Amendments. Reductions in NO<sub>x</sub>, VOCs, and air toxics are proving especially difficult to achieve, opening the door for innovative technological solutions. Biomass sources need to be given legitimacy in this context by ensuring that SIPs adopt a total fuel-cycle perspective. There may also be opportunities to provide input on biomass total fuel cycle impacts to regional air quality groups such as the Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission.

**Market Incentives and the Role of Biomass in Mitigating Greenhouse Gas Emissions.** One of the important environmental benefits offered by biomass power is the potential to dramatically reduce net greenhouse gas emissions, specifically net emissions of carbon dioxide. Many electric utilities are looking actively for ways to reduce their net CO<sub>2</sub> emissions in response

**Report Available**—Oak Ridge National Laboratory, Environmental Sciences Division, has published *Potential Supply and Cost of Biomass from Energy Crops in the TVA Region* (publication No. 4306). The economic and supply structures of energy crop markets have not been established. In this study, the cost and supply of short-rotation woody crop (SRWC) and switchgrass biomass for the Tennessee Valley Authority (TVA) region—a 276-county area that includes portions of 11 states in the southeastern United States—are projected. Projected prices and quantities of biomass are assumed to be a function of the amount and quality of crop and pasture land available in a region, expected energy crop yields and production costs on differing soils and land types, and the profit that could be obtained from current conventional crop production on these same lands. The results of sensitivity analysis on the projected cost and supply of energy crop biomass are shown. The separate impacts of varying energy crop production costs and yields, and interest rates are examined. This report is available to DOE and DOE contractors from OSTI, P.O. Box 62, Oak Ridge, TN 37831; prices available from (615) 576-8401. Available to the public from the NTIS, U.S. Dept. of Commerce, 5285 Port Royal Rd., Springfield, VA 22161.

# **NSP Announces Biomass Bid Finalists**

**Finalists**—Northern States Power Company (NSP) announced that an independent bid evaluation firm selected several developers as finalists in NSP's competitive bidding process to supply 50 megawatts (Mw) of "farm-grown, closed-loop biomass" generation resources to NSP. This 50-Mw increment represents Phase I of NSP's commitment to have 125 Mw of farm-grown, closed-loop biomass generation in place by the end of 2002. Closed-loop biomass, which is organic material grown in whole or in part for energy production, results in no net carbon dioxide emissions throughout the cycle of growth to burning for energy. Once the power plant is operating, it will be the first dedicated crop-fueled plant of its size in the world. NSP and the independent evaluator will meet with these bidders to clarify their proposals. NSP anticipates awarding the power purchase contract by the end of the year. For more information, contact NSP media representatives, (612) 337-2167; or Northern States Power Company, 414 Nicollet Mall, Minneapolis, MN 55401-1927, (612) 330-5500.

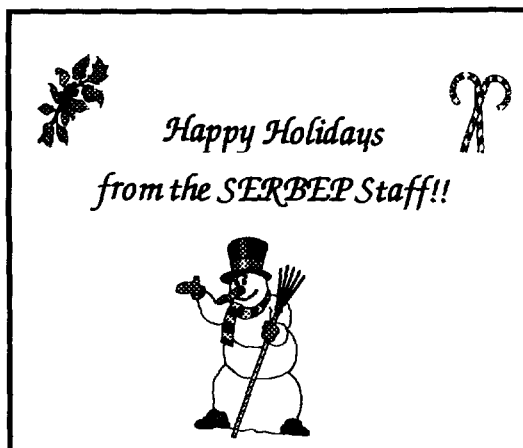
to the Climate Challenge element of the Climate Change Action Plan, and in response to the general perception that regulatory and political pressure to reduce carbon emissions could well increase over time. Since all of the carbon in biomass is derived from the atmosphere via plant or tree growth, the process of growing and combusting biomass can be viewed as a carbon recycling process. However, one concern expressed by the public, as well as regulators, has been whether the biomass fuel will be provided on a sustainable basis. In particular, if wood is being obtained from forests, there may be a concern that this could potentially contribute to gradual deforestation or a net reduction in standing biomass over time. In order for biomass power to receive credit for reducing CO<sub>2</sub> emissions, it is quite possible that criteria will be put in place to provide some level of assurance that biomass fuels are procured on a sustainable basis. Vermont and Massachusetts are two states that have cited criteria for biomass power to receive credit for reducing CO<sub>2</sub> emissions, in the context of integrated resource planning (IRP) processes for electric utilities.

**Production Incentives**—The Energy Policy Act (EPA) of 1992 provides yet another market incentive for reducing CO<sub>2</sub> emissions. The act provides for an income tax credit of 1.5 cents/kWh for electricity generated from wind or from closed-loop biomass systems. Closed-loop biomass systems are defined as those which use organic material from plants that are grown exclusively for electricity production, creating a renewable energy source. As a result, the credit is not available when using waste forms of biomass to generate electricity. Any form of energy crop used exclusively as fuel for electricity generation qualifies for the credit, except standing timber which is specifically disqualified. The act seems to imply that biomass harvesting from sources other than closed loop energy crop systems are unsustainable. Green certification of tree farming and forest management could be proposed as an approach that could help persuade Congress to expand the allowable biomass

fuels eligible for the credit, when this fuel is certified based on sustainable forest management practices. This approach could help justify the expanded availability of the 1.5 cent/kWh tax credit to biomass power facilities that use fuelwood obtained under a green certification framework.

**Summary.** While biomass power faces substantial challenges in competing in the current utility arena, the above discussion illustrates that there are a number of innovative approaches that can help provide a broader, more insightful treatment of the total fuel-cycle impacts of biomass. Adopting some of these approaches may significantly increase the chance that important ratepayer benefits are recognized by decision-makers in the utility arena. By adopting a balanced portfolio approach in the slate of fuels and technologies that are used for producing electric power, a modest commitment to some use of biomass could help provide a hedge against current trends toward heavy dependence on new natural gas generating capacity. Including biomass power as a component in a diversified portfolio of power generating options offers utilities important benefits in managing the level of risk they face as they approach an uncertain and rapidly changing future.

*(Excerpts from a paper by Jim Easterly of DynCorp EENSP, Inc., Alexandria, VA, presented at the Second Biomass Conference of the Americas, Portland, Oregon, August 21-24, 1995.)*



## Calendar of Events

### December 4-5, 1995

Arlington, Virginia  
*Sustainable Development and Global Climate Change*  
Center for Environmental Information,  
50 West Main Street,  
Rochester, NY 14614-1218  
tel (716) 262-2870  
fax (716) 262-4156

### December 6-8, 1995

San Diego, California  
*SAE International Alternative Fuels Conference & Exposition*  
Sandi Kline, Alternative Fuels Conf.,  
SAE, 400 Commonwealth Dr.,  
Warrendale, PA 15096-0001

### December 11, 1995

Miami Beach, Florida  
*The 3rd Annual Southeast Power Market Conference, Restructuring the Southeast Power Market*  
Southeast Power Report, 1221 Avenue of the Americas, New York, NY 10020  
fax (212) 512-2723

## 1996

### January 22-24, 1996

New Delhi, India  
*2nd Annual Renewable Energy, South Asia '96*  
Cassy Kurtzman  
fax +852 2574 1997

### February 5-7, 1996

Nebraska City, Nebraska  
*Trees and Utilities National Conference*  
The National Arbor Day Foundation,  
P.O. Box 81415,  
Lincoln, NE 68501-1415  
tel (402) 474-5655  
fax (402) 474-0820

### March 22-25, 1996

Charlotte, North Carolina  
*Hearth & Home Expo '96*  
Hearth Products Association, 1555  
Wilson Blvd., Suite 300,  
Arlington, VA 22209  
tel (703) 875-8711  
fax (703) 812-8875

### March 25-28, 1996

Salt Lake City, Utah  
*40th Annual APPA Engineering & Operations Workshop*  
Joy Arthurs, APPA, 2301 M St., NW,  
Washington, DC 20037  
tel (202) 467-2907

### April 13-18, 1996

Asheville, North Carolina  
*Solar 96, National Solar Energy Conference*  
American Solar Energy Society, 2400  
Central Avenue, Suite G-1,  
Boulder, CO 80301  
tel (303) 443-3130  
fax (303) 443-3212

### April 14-17, 1996

Sun City, South Africa  
*11th International Symposium on Alcohol Fuels*  
Professor R. K. Dutkiewicz, Energy  
Research Institute, University of Cape  
Town, P.O. Box 207, Cape Town,  
7800, South Africa  
fax (27) (021) 705-6266

### April 28-May 3, 1996

Snowbird, Utah  
*Biomass Usage for Utility and Industrial Power*  
Engineering Foundation, 345 East 47th  
St., New York, NY 10017  
tel (212) 705-7836  
fax (212) 705-7441  
E-mail engfnd@aol.com

### May 5-9, 1996

Gatlinburg, Tennessee  
*Eighteenth Symposium on Biotechnology for Fuels and Chemicals*  
Brian H. Davison, Oak Ridge National  
Laboratory, PO Box 2008, Bldg. 4505,  
Oak Ridge, TN 37831-6226  
tel (423) 576-8522  
fax (423) 574-6442

### May 20-24, 1996

Banff, Canada  
*Developments in Thermochemical Biomass Conversion*  
Dr. Tony Bridgwater, Energy  
Research Group, Aston University,  
Birmingham B47ET, United Kingdom  
tel: +44 121 359 3611 ext. 4647  
fax: +44 121 359 4094

### June 4-6, 1996

*Corn Utilization Conference VI*  
St. Louis, Missouri  
Technical Coordinator: Dr. Eugene  
Iannotti, Univ. of Missouri @ Columbia  
(314) 882-7510  
NCGA Office Contact: Ann Beirne,  
(314) 275-9915

### June 24-27, 1996

Copenhagen, Denmark  
*9th European Bioenergy Conference*  
DIS Congress Service Copenhagen  
A/S, Herlev Ringvej 2C, DK-2730,  
Herlev, Denmark  
fax +45 - 4492 5050

### July 14-18, 1996

San Diego, California  
*Fifth World Congress of Chemical Engineering*  
AIChE Express Service Center  
345 East 47th St.  
New York, NY 10017-2395  
tel (212) 705-7373  
fax (212) 705-8400

### September 1996

Jakarta, Indonesia  
*3rd Annual Renewable Energy, Asia Pacific '96*  
Cassy Kurtzman  
fax +852 2574 1997

### September 15-17, 1996

Nashville, Tennessee  
*ASAE Liquid Fuel and Industrial Products From Renewable Products*  
Susan Buntjer, ASAE, 2950 Niles Rd.,  
St. Joseph, MI 49085-9659  
tel (616) 428-6327  
fax (616) 429-3852  
e-mail buntjer@asae.org

### September 15-19, 1996

Nashville, Tennessee  
*Bioenergy '96--The Seventh National Bioenergy Conference*  
Phillip Badger, TVA Southeastern  
Regional Biomass Energy Program,  
Muscle Shoals, AL 35662-1010  
tel (205) 386-2925  
fax (205) 386-2963



**SERBEP Update**  
Southeastern Regional Biomass Energy Program  
Tennessee Valley Authority, CEB 3A  
Reservation Road  
P.O. Box 1010  
Muscle Shoals, AL 35662-1010  
(Non-US Postal Service Zip Code 35661)

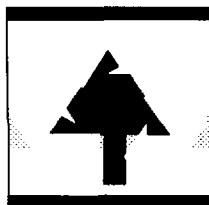
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SERBEP  
UPDATE

The use of trade names is for information purposes only and does not imply endorsement, nor does the omission imply lack of endorsement, by the federal government.

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**Just a reminder**—Each month we receive returned newsletters with no forwarding address available. We are forced to remove these names from our mailing list. If you have moved and wish to keep receiving the *SERBEP Update*, please be sure to send us your new address.

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## BIOENERGY '96--The Seventh National Bioenergy Conference

*Partnerships to Develop and Apply Biomass Technologies*

*(Hosted by the Southeastern Regional Biomass Energy Program  
Conducted jointly with the ASAE Third Liquid Fuel Conference)*

**September 15-19, 1996, The Opryland Hotel, Nashville, Tennessee**

For more information contact: Southeastern Regional Biomass Energy Program  
Tennessee Valley Authority, CEB 3A, P.O. Box 1010, Muscle Shoals, AL 35662-1010  
*Technical Information:* Phillip Badger, 205-386-3086, fax (205) 386-2963  
*Conference Logistics:* Bonnie Watkins, 205-386-2925, fax (205) 386-2963  
*Trade Show Information:* William Miller, (919) 927-1770, fax same

### SERBEP REQUEST FOR PREPROPOSALS

SERBEP has issued a Request for Preproposals (RFP) for cooperative biomass energy projects. This solicitation differs from previous SERBEP RFPs in that only *demonstration* type projects are sought and only *preproposals* are sought at this point. RFP requirements are that projects submitted be bioenergy related, demonstration in nature, and innovative. Overall minimum cost-sharing of at least one-to-one from nonfederal sources is a requirement. Due date for all preproposals is 5 p.m. CST, Wednesday, January 31, 1996. If you are not on our mailing list to receive the RFP and would like a copy, please contact the SERBEP office immediately.